UTILITY MODEL NO. Sho 56-77805

WAVEGUIDE LIGHT-SCATTERING DEVICE

[Translated from Japanese]

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JAPANESE PATENT OFFICE (JP)

UTILITY MODEL NO. Sho 56-77805

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Utility Model Application

To: The Commissioner of the Japanese Patent Office

1. Title of Design

Waveguide light-scattering device

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5. List of attachment:

(1) Specification 1 copy
(2) Drawing 1 copy
(3) Powder of attorney
1 copy
(4) Copy of application
1 copy

[There are no amendments to this patent.]

[Translator's note: Names of products and firms are spelled phonetically in this translation.]

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Specification

1. Title of design

Waveguide light-scattering device

2. Claims of the design

(1) A waveguide light-scattering device structure in which scatterers that do not absorb the beam of light and do not undergo chemical reaction with the light-transmitting medium are included inside a light transmitting medium where a beam of light is directed based on total reflection and is structured so that the aforementioned beam of light is directed to the outside of the aforementioned light transmitting medium based on scattering by the above-mentioned scatterer.

(2) The waveguide light-scattering device described in Claim 1 in which the scatterer is one or more of magnesium oxide, zinc oxide, and titanium oxide.

(3) The waveguide light-scattering device described in Claim 1 in which the scatterer is a cell.

3. Detailed description of the design

The present invention pertains to an element used for guiding a beam of light that passes

through it with a light-transmitting medium inside.

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As a means to guide a beam of light that passes through a light-transmitting medium, a method where a grating or V grooves are formed on the surface of light transmission path in a light integrating circuit, a method where prisms are applied, a method where tapering is provided along the light transmission path, etc. have been known in the past. But all of the above-mentioned methods are designed for optical couplers and the purpose is to guide light along a light transmission path and isotropic guiding of light is not possible.

The purpose of the present design is to provide a waveguide light-scattering device capable of guiding a beam of light that passes through the light transmission path in one direction as well as isotropically outside the light transmission path.

The present design is explained in further detail using the prior art, a working example of the present design, and drawings as references.

Fig. 1 shows a means for guiding to the outside a beam of light that passes through a light transmission path that has been used in the past; beam of light 12 passes through light transmission path 11 encounters total internal reflection and is guided to the outside.

In the aforementioned prior art, the beam of light guided outside by the light transmission path can be observed from one end alone. On the other hand, the beam of light can be guided to the outside isotropically along the light transmission path.

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Fig. 2 shows a working example of the waveguide light-scattering device of the present design. In the figure, beam of light 22 passes through light transmission path 21 experiences total internal reflection and is scattered by scatterers 23 and a part of the light does not experience total internal reflection along light transmission path 21 and exits to the outside. In the aforementioned working example, a plastic fiber dispersed with cells made of magnesium

oxide, zinc oxide, or titanium oxide is used as the scatterer inside the light-transmitting medium and an excellent scattering effect is achieved. Furthermore, aluminum, etc. may be deposited on one surface of the light transmission path that includes the scatterer so as to reflect scattered light to increase the brightness of the other surface. In this case, the scatterer can be dispersed in plastic and can be made into any desired size; thus, it can be applied as a surface light for rooms, decorative lighting, local lighting, etc.

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Fig. 3 shows a different working example of the present design. Linear beam of light 31 enters light-transmitting medium 32 and passes through the light-transmitting medium, is scattered by scatterer 33, and guided outside light transmission path 32. In the aforementioned working example, as a scatterer, magnesium oxide is dispersed in an acrylic resin (product of Mitsubishi Rayon Co., (Ltd.), "Daiyanal LR-1065"), and sufficient brightness as a surface light is observed.

Fig. 4 shows a different working example of the present design. Linear beam of light 41 enters light-transmitting medium 42 passes through the light-transmitting medium, is scattered by scatterer 43, and is guided outside the light-transmitting medium 42. In the aforementioned working example, a film known by the trade name "Calver film" of Canon Corp. was used as the light-transmitting medium, and decomposition of the diazo compound included in said film was achieved by exposure, and the nitrogen generated was fixed inside the film as cells by a heat-treatment and serves as the scatterer. The diameter of the aforementioned scatterer is in the range of 0.5 to 2 μm. In Fig. 4, a working example where the beam of light that passes through the light-transmitting medium is guided to form a character pattern is shown, and the aforementioned vesicular method where nitrogen is fixed inside the film as cells is capable of achieving a resolution of 500 lines/mm, and the beam of light that passes through the light-transmitting medium can be guided as a desired pattern.

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As described above, the waveguide light-scattering device of concern in the present design is capable of guiding the beam of light that passes through the light transmission path isotropically outside the light transmission path, can be made into any desired size, thus, it can be applied as a variety of lighting elements and display devices.

4. Brief description of the figures

Fig. 1 shows a means for guiding the beam of light of the prior art that passes through a light transmission path to the outside. Fig. 2, Fig. 3, and Fig. 4 show working examples of waveguide light-scattering devices of concern in the present design.

Explanation of codes

21, 32, 42 ... light-transmitting medium, 22 ... waveguide light, 23, 33, 43 ... scatterers, 31, 41 ... linear beam of light

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Fig. 1

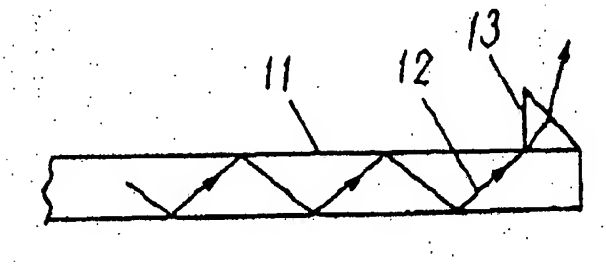

Fig. 2

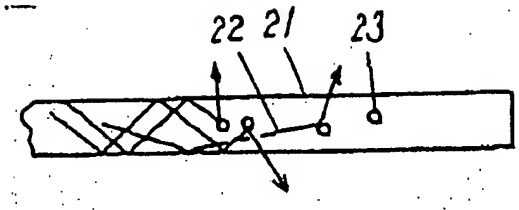

Fig. 3

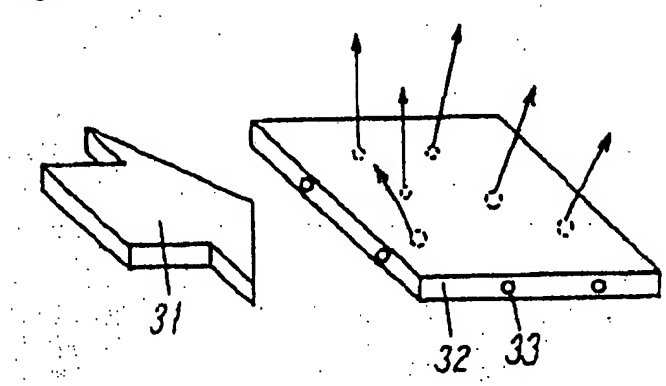

Fig. 4